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EXAMINER	
AHN, SANGWOO	

ART UNIT	PAPER NUMBER
2166	

DATE MAILED: 10/30/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/815,231	FAUNCE ET AL.	
	Examiner	Art Unit	
	Sangwoo Ahn	2166	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *31 March 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-29* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-29* is/are rejected.

7)☒ Claim(s) *15* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *31 March 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

Claim 15 is objected to because of the following informalities:

Claim 15 recites "The method of claim 9". There seems to be a typological error.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1, 9 and 16, and their depend claims 2, 4, 10, 12 – 13, 17 – 19 and 21 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 1, 9 and 16 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential steps, such omission amounting to a gap between the steps. See MPEP § 2172.01. The omitted steps could be rewriting the query.

Claims 2, 4, 10, 12 – 13, 17 – 19 and 21 are also rejected as they depend on claims 1, 9 and 16, and do not satisfy the above-stated condition.

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 16 and 22, and their dependent claims are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

Claim 16 recites "computer-readable signal bearing media". Signals or waves are a form of energy and energy does not fall into one of the categories of invention. Therefore, claim 16 is directed to non-statutory subject matter.

Claims 17 – 21 are also rejected as they depend on claim 16 (Examiner would also like to note that claim 18's "transmission media" also falls into non-statutory subject matter).

Claim 22 recites ""computer-readable signal bearing media". Signals or waves are a form of energy and energy does not fall into one of the categories of invention. Therefore, claim 22 is directed to non-statutory subject matter.

Claims 23 – 25 are also rejected as they depend on claim 22 (Examiner would also like to note that claim 24's "transmission media" also falls into non-statutory subject matter).

Claim 9 and its dependent claims 10, 12 and 13 are rejected 35 U.S.C. 101 because the method claim does not produce any tangible result. It claims "a method of optimizing a query" but the steps recited in the body (evaluating a query, determining if index exists, and using statistical information) do not produce any tangible result (e.g. rewritten query, etc.).

Claims 10, 12 and 13 are also rejected as they depend on claim 9 and do not satisfy the above-stated condition.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 9 and 16 – 18 are rejected under 35 U.S.C. 102(b) as being anticipated by Christina Marie Lee et al (hereinafter "Lee").

Regarding claim 1, Lee discloses,

An apparatus comprising:

at least one processor (Figure 1 element 2, et seq.);

a memory coupled to the at least one processor (Figure 1 element 2, et seq.);

a database table residing in the memory (column 1 lines 39 – 40, et seq.);

a query residing in the memory that accesses the database table (Figure 1 element 20, et seq.);

a query optimizer residing in the memory and executed by the at least one processor (Figure 1 element 20, et seq.), wherein the query optimizer analyzes the query, and if no optimal index for the query exists, the query optimizer determines if a sub-optimal index exists, a sub-optimal index including at least one key referenced in the query and additionally including at least one additional key that prevents traversal of the sub-optimal index to determine the number of rows that the query will return (column 2 lines 42 – 44, column 6 lines 56 – 60, et seq.), wherein if a sub-optimal index exists, the query optimizer uses statistical information for each additional key to bridge any gaps in the sub-optimal index when probing the sub-optimal index to optimize the query (column 6 lines 14 – 19; 42 – 47, et seq.).

Regarding claim 9, Lee discloses,

A method for optimizing a database query for a database table, the method comprising the steps of:

evaluating the query (Figure 1 element 20, column 5 lines 31 – 33, et seq.);

determining whether an optimal index for the query exists (column 5 lines 61 – 65, et seq.);

if no optimal index exists, determining whether a sub-optimal index for the query exists, a sub-optimal index including at least one key referenced in the query and additionally including at least one additional key that prevents traversal of the sub-optimal index to determine the number of rows that the query will return (column 2 lines 42 – 44, column 6 lines 56 – 60, et seq.); and

if a sub-optimal index exists, using statistical information for each additional key to bridge any gaps in the sub-optimal index when probing the sub-optimal index to determine an estimated number of rows in the database that satisfy the query (column 6 lines 14 – 19; 42 – 47, et seq.).

Regarding claim 16, Lee discloses,

A program product comprising:

(A) a query optimizer that analyzes a query for a database table, and if no optimal index for the query exists, the query optimizer determines if a sub-optimal index exists, a sub-optimal index including at least one key referenced in the query and additionally including at least one additional key that prevents traversal of the sub-optimal index to determine the number of rows that the query will return (column 2 lines 42 – 44, column 6 lines 56 – 60, et seq.), wherein if a sub-optimal index exists, the query optimizer uses statistical information for each additional key

to bridge any gaps in the sub-optimal index when probing the sub-optimal index to optimize the query (column 6 lines 14 – 19; 42 – 47, et seq.); and

(B) computer-readable signal bearing media bearing the query optimizer.

Regarding claim 17, Lee discloses the computer-readable signal bearing media comprises recordable media (column 5 lines 18 – 29, et seq.).

Regarding claim 18, Lee discloses the computer-readable signal bearing media comprises transmission media (column 5 lines 18 – 29, et seq.).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 2, 10 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee in view of U.S. Publication Number 2004/0122845 issued to Guy Maring Lohman et al (hereinafter "Lohman").

Regarding claim 2, Lee discloses the apparatus of claim 1.

Lee does not explicitly disclose the statistical information comprises a frequent value list.

However, Lohman discloses the statistical information comprises a frequent value list (paragraph 35 lines 10 – 15, et seq.). At the time of the present invention, it would have been obvious to a person of ordinary skill in the data processing art to combine the two references because Lohman's use of frequent value list would have enabled Lee's overall system to estimate query cost, and also automate the process of candidate selection.

Regarding claim 10, Lee discloses the method of claim 9.

Lee does not explicitly disclose the statistical information comprises a frequent value list.

However, Lohman discloses the statistical information comprises a frequent value list (paragraph 35 lines 10 – 15, et seq.). At the time of the present invention, it would have been obvious to a person of ordinary skill in the data processing art to combine the two references because Lohman's use of frequent value list would have enabled Lee's overall system to estimate query cost, and also automate the process of candidate selection.

Regarding claim 19, Lee discloses the program product of claim 16.

Lee does not explicitly disclose the statistical information comprises a frequent value list.

However, Lohman discloses the statistical information comprises a frequent value list (paragraph 35 lines 10 – 15, et seq.). At the time of the present invention, it would have been obvious to a person of ordinary skill in the data processing art to combine the two references because Lohman's use of frequent value list would have enabled Lee's overall system to estimate query cost, and also automate the process of candidate selection.

Claims 4, 12 – 13 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee in view of U.S. Publication Number 2004/0225639 issued to Hakan Jakobsson et al (hereinafter "Jakobsson").

Regarding claim 4, Lee discloses the apparatus of claim 1.

Lee does not explicitly disclose determining an estimated number of rows in the database that satisfy the query.

However, Jakobsson discloses determining an estimated number of rows in the database table that satisfy the query (paragraph 10 lines 10 – 16, et seq.). At the time of the present invention, it would have been obvious to a person of ordinary skill in the data processing art to combine the two references because Jakobsson's method of determining an estimated

number of rows that satisfy the query would have enabled Lee's overall system to estimate the cost of alternative execution plans (paragraph 10 line 3, et seq.) and reduce CPU usage and physical disk reads (paragraph 33 lines 1 – 2, et seq.).

Regarding claim 12, Lee discloses the method of claim 9.

Lee does not explicitly disclose determining an estimated number of rows in the database that satisfy the query.

However, Jakobsson discloses determining an estimated number of rows in the database table that satisfy the query (paragraph 10 lines 10 – 16, et seq.). At the time of the present invention, it would have been obvious to a person of ordinary skill in the data processing art to combine the two references because Jakobsson's method of determining an estimated number of rows that satisfy the query would have enabled Lee's overall system to estimate the cost of alternative execution plans (paragraph 10 line 3, et seq.) and reduce CPU usage and physical disk reads (paragraph 33 lines 1 – 2, et seq.).

Regarding claim 13, Lee discloses the method of claim 9.

Lee does not explicitly disclose determining a number of rows in the database that satisfy the query.

However, Jakobsson discloses determining a number of rows in the database table that satisfy the query (paragraph 10 lines 10 – 16, et seq.). At the time of the present invention, it would have been obvious to a person of ordinary skill in the data processing art to combine the two references because Jakobsson's method of determining an estimated number of rows that satisfy the query would have enabled Lee's overall system to estimate the cost of alternative execution plans (paragraph 10 line 3, et seq.) and reduce CPU usage and physical disk reads (paragraph 33 lines 1 – 2, et seq.).

Regarding claim 21, Lee discloses the program product of claim 16.

Lee does not explicitly disclose determining an estimated number of rows in the database that satisfy the query.

However, Jakobsson discloses determining an estimated number of rows in the database table that satisfy the query (paragraph 10 lines 10 – 16, et seq.). At the time of the present invention, it would have been obvious to a person of ordinary skill in the data processing art to combine the two references because Jakobsson's method of determining an estimated number of rows that satisfy the query would have enabled Lee's overall system to estimate the cost of alternative execution plans (paragraph 10 line 3, et seq.) and reduce CPU usage and physical disk reads (paragraph 33 lines 1 – 2, et seq.).

Claims 3, 11 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee and Lohman, further in view of U.S. Publication Number 2005/0097084 issued to Andrey L. Balmin et al (hereinafter "Balmin").

Regarding claim 3, Lee and Lohman disclose the apparatus of claim 2.

Lee and Lohman do not explicitly disclose rewriting the query by adding a reference to each additional key.

However, Balmin discloses rewriting the query by adding a reference to each additional key (paragraph 17, et seq.). At the time of the present invention, it would have been obvious to a person of ordinary skill in the data processing art to combine the references because Balmin's method of rewriting the query would have enabled Lee and Lohman's overall system to speed up the processing of potentially expensive queries by using pre-computed information (paragraph 16 lines 1 – 3, et seq.).

Regarding claim 11, Lee and Lohman disclose the method of claim 10.

Lee and Lohman do not explicitly disclose rewriting the query by adding a reference to each additional key.

However, Balmin discloses rewriting the query by adding a reference to each additional key (paragraph 17, et seq.). At the time of the present invention, it would have been obvious to a person of ordinary skill in the data processing art to combine the references because Balmin's method of rewriting the query would have enabled Lee and Lohman's overall system to speed up the processing of potentially expensive queries by using pre-computed information (paragraph 16 lines 1 – 3, et seq.).

Regarding claim 20, Lee and Lohman disclose the program product of claim 19.

Lee and Lohman do not explicitly disclose rewriting the query by adding a reference to each additional key.

However, Balmin discloses rewriting the query by adding a reference to each additional key (paragraph 17, et seq.). At the time of the present invention, it would have been obvious to a person of ordinary skill in the data processing art to combine the references because Balmin's method of rewriting the query would have enabled Lee and Lohman's overall system to speed up the processing of potentially expensive queries by using pre-computed information (paragraph 16 lines 1 – 3, et seq.).

Claims 5, 7, 14, 22 – 24 and 26 – 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee in view of U.S. Publication Number 2005/0097084 issued to Andrey L. Balmin et al, further in view of U.S. Publication Number 2004/0225639 issued to Hakan Jakobsson et al (hereinafter "Balmin" and "Jakobsson").

Regarding claim 5, Lee discloses,

An apparatus comprising:

at least one processor;

a memory coupled to the at least one processor;

a database table residing in the memory;

a query residing in the memory that accesses the database table; and

a query optimizer residing in the memory and executed by the at least one processor, wherein the query optimizer analyzes the query, and if no optimal index for the query exists, the query optimizer determines if a sub-optimal index exists, a sub-optimal index including at least one key referenced in the query and additionally including at least one additional key that prevents traversal of the sub-optimal index to determine the number of rows that the query will return, wherein if a sub-optimal index exists, the query optimizer, for each additional key in the sub-optimal index, reads statistical information regarding the additional key (See claim 1 rejection).

Lee does not explicitly disclose,

• rewriting the query using the statistical information in a manner that allows probing the sub-optimal index according to the rewritten query.

• determining from the sub-optimal index an estimated number of rows in the database table that satisfy the query.

However, Balmin and Jakobsson respectively disclose the above features.

First, Balmin discloses rewriting the query using the statistical information in a manner that allows probing the sub-optimal index according to the rewritten query (paragraph 17, et seq.). At the time of the present invention, it would have been obvious to a person of ordinary skill in the data processing art to combine the two references because Balmin's method of rewriting the query would have enabled Lee's overall system to speed up the processing of potentially expensive queries by using pre-computed information (paragraph 16 lines 1 – 3, et seq.).

Second, Jakobsson discloses determining from the sub-optimal index an estimated number of rows in the database table that satisfy the query (paragraph 10 lines 10 – 16, et

seq.). At the time of the present invention, it would have been obvious to a person of ordinary skill in the data processing art to combine the two references because Jakobsson's method of determining an estimated number of rows that satisfy the query would have enabled Lee's overall system to estimate the cost of alternative execution plans (paragraph 10 line 3, et seq.) and reduce CPU usage and physical disk reads (paragraph 33 lines 1 – 2, et seq.).

Regarding claim 7, Lee discloses,

An apparatus comprising:

at least one processor;

a memory coupled to the at least one processor;

a database table residing in the memory;

a query residing in the memory that accesses the database table;

an index residing in the memory that includes at least one key referenced in the query and additionally includes at least one additional key that prevents traversal of the index to determine the number of rows that the query will return (Figure 3, et seq.); and

a query optimizer residing in the memory and executed by the at least one processor, wherein the query optimizer, for each additional key in the index, reads statistical information regarding the additional key (See claim 1).

Lee does not explicitly disclose,

• rewriting the query using the statistical information in a manner that allows probing the sub-optimal index according to the rewritten query.

• determining from the sub-optimal index an estimated number of rows in the database table that satisfy the query.

However, Balmin and Jakobsson respectively disclose the above features.

First, Balmin discloses rewriting the query using the statistical information in a manner that allows probing the sub-optimal index according to the rewritten query (paragraph 17, et seq.). At the time of the present invention, it would have been obvious to a person of ordinary skill in the data processing art to combine the two references because Balmin's method of rewriting the query would have enabled Lee's overall system to speed up the processing of potentially expensive queries by using pre-computed information (paragraph 16 lines 1 – 3, et seq.).

Second, Jakobsson discloses determining from the sub-optimal index an estimated number of rows in the database table that satisfy the query (paragraph 10 lines 10 – 16, et seq.). At the time of the present invention, it would have been obvious to a person of ordinary skill in the data processing art to combine the two references because Jakobsson's method of determining an estimated number of rows that satisfy the query would have enabled Lee's overall system to estimate the cost of alternative execution plans (paragraph 10 line 3, et seq.) and reduce CPU usage and physical disk reads (paragraph 33 lines 1 – 2, et seq.).

Regarding claim 14, Lee discloses,

A method for optimizing a database query for a database table, the method comprising the steps of:

(1) analyzing the query;

(2) if no optimal index for the query exists, determining if a sub-optimal index exists, a sub-optimal index including at least one key referenced in the query and additionally including at least one additional key that prevents traversal of the sub-optimal index to determine the number of rows that the query will return;

(3) if a sub-optimal index exists, performing the following steps for each additional key in the sub-optimal index that prevents traversal of the sub-optimal index to determine the number of rows that the query will return:

(A) reading statistical information regarding the additional key; and

(4) probing the sub-optimal index (See claim 9).

Lee does not explicitly disclose,

• rewriting the query using the statistical information in a manner that allows probing the sub-optimal index according to the rewritten query.

• determining from the sub-optimal index an estimated number of rows in the database table that satisfy the query.

However, Balmin and Jakobsson respectively disclose the above features.

First, Balmin discloses rewriting the query using the statistical information in a manner that allows probing the sub-optimal index according to the rewritten query (paragraph 17, et seq.). At the time of the present invention, it would have been obvious to a person of ordinary skill in the data processing art to combine the two references because Balmin's method of rewriting the query would have enabled Lee's overall system to speed up the processing of potentially expensive queries by using pre-computed information (paragraph 16 lines 1 – 3, et seq.).

Second, Jakobsson discloses determining from the sub-optimal index an estimated number of rows in the database table that satisfy the query (paragraph 10 lines 10 – 16, et seq.). At the time of the present invention, it would have been obvious to a person of ordinary skill in the data processing art to combine the two references because Jakobsson's method of determining an estimated number of rows that satisfy the query would have enabled Lee's

overall system to estimate the cost of alternative execution plans (paragraph 10 line 3, et seq.) and reduce CPU usage and physical disk reads (paragraph 33 lines 1 – 2, et seq.).

Regarding claim 22, Lee discloses,

A program product comprising:

(A) a query optimizer that analyzes a query for a database table, and if no optimal index for the query exists, the query optimizer determines if a sub-optimal index exists, a sub-optimal index including at least one key referenced in the query and additionally including at least one additional key that prevents traversal of the sub-optimal index to determine the number of rows that the query will return (column 2 lines 42 – 44, column 6 lines 56 – 60, et seq.), wherein if a sub-optimal index exists, the query optimizer, for each additional key in the sub-optimal index, reads statistical information regarding the additional key (column 6 lines 14 – 19; 42 – 47, et seq.); and

(B) computer-readable signal bearing media bearing the query optimizer.

Lee does not explicitly disclose,

• rewriting the query using the statistical information in a manner that allows probing the sub-optimal index according to the rewritten query.

• determining from the sub-optimal index an estimated number of rows in the database table that satisfy the query.

However, Balmin and Jakobsson respectively disclose the above features.

First, Balmin discloses rewriting the query using the statistical information in a manner that allows probing the sub-optimal index according to the rewritten query (paragraph 17, et seq.). At the time of the present invention, it would have been obvious to a person of ordinary skill in the data processing art to combine the two references because Balmin's method of rewriting the query would have enabled Lee's overall system to speed up the processing of

potentially expensive queries by using pre-computed information (paragraph 16 lines 1 – 3, et seq.).

Second, Jakobsson discloses determining from the sub-optimal index an estimated number of rows in the database table that satisfy the query (paragraph 10 lines 10 – 16, et seq.). At the time of the present invention, it would have been obvious to a person of ordinary skill in the data processing art to combine the two references because Jakobsson's method of determining an estimated number of rows that satisfy the query would have enabled Lee's overall system to estimate the cost of alternative execution plans (paragraph 10 line 3, et seq.) and reduce CPU usage and physical disk reads (paragraph 33 lines 1 – 2, et seq.).

Regarding claim 23, Lee discloses the computer-readable signal bearing media comprises recordable media (column 5 lines 18 – 29, et seq.).

Regarding claim 24, Lee discloses the computer-readable signal bearing media comprises transmission media (column 5 lines 18 – 29, et seq.)3

Regarding claim 26, Lee discloses,

A program product comprising:

(A) a query optimizer that processes a query for a database table using a sub-optimal index that includes at least one key referenced in the query and additionally includes at least one additional key that prevents traversal of the sub-optimal index to determine the number of rows that the query will return (column 2 lines 42 – 44, column 6 lines 56 – 60, et seq.), wherein the query optimizer, for each additional key in the index, reads statistical information regarding the additional key (column 6 lines 14 – 19; 42 – 47, et seq.); and

(B) computer-readable signal bearing media bearing the query optimizer.

Lee does not explicitly disclose,

• rewriting the query using the statistical information in a manner that allows probing the sub-optimal index according to the rewritten query.

• determining from the sub-optimal index an estimated number of rows in the database table that satisfy the query.

However, Balmin and Jakobsson respectively disclose the above features.

First, Balmin discloses rewriting the query using the statistical information in a manner that allows probing the sub-optimal index according to the rewritten query (paragraph 17, et seq.). At the time of the present invention, it would have been obvious to a person of ordinary skill in the data processing art to combine the two references because Balmin's method of rewriting the query would have enabled Lee's overall system to speed up the processing of potentially expensive queries by using pre-computed information (paragraph 16 lines 1 – 3, et seq.).

Second, Jakobsson discloses determining from the sub-optimal index an estimated number of rows in the database table that satisfy the query (paragraph 10 lines 10 – 16, et seq.). At the time of the present invention, it would have been obvious to a person of ordinary skill in the data processing art to combine the two references because Jakobsson's method of determining an estimated number of rows that satisfy the query would have enabled Lee's overall system to estimate the cost of alternative execution plans (paragraph 10 line 3, et seq.) and reduce CPU usage and physical disk reads (paragraph 33 lines 1 – 2, et seq.).

Regarding claim 27, Lee discloses the computer-readable signal bearing media comprises recordable media (column 5 lines 18 – 29, et seq.).

Regarding claim 28, Lee discloses the computer-readable signal bearing media comprises transmission media (column 5 lines 18 – 29, et seq.)3

Claims 6, 8, 15, 25 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee, Balmin and Jakobsson, further in view of Lohman.

Regarding claim 6, Lee, Balmin and Jakobsson disclose the apparatus of claim 5.

Lee, Balmin and Jakobsson do not explicitly disclose the statistical information comprises a frequent value list.

However, Lohman discloses the statistical information comprises a frequent value list (paragraph 35 lines 10 – 15, et seq.). At the time of the present invention, it would have been obvious to a person of ordinary skill in the data processing art to combine the two references because Lohman's use of frequent value list would have enabled Lee, Balmin and Jakobsson's overall system to estimate query cost, and also automate the process of candidate selection.

Regarding claim 8, Lee, Balmin and Jakobsson disclose the apparatus of claim 7.

Lee, Balmin and Jakobsson do not explicitly disclose the statistical information comprises a frequent value list.

However, Lohman discloses the statistical information comprises a frequent value list (paragraph 35 lines 10 – 15, et seq.). At the time of the present invention, it would have been obvious to a person of ordinary skill in the data processing art to combine the two references because Lohman's use of frequent value list would have enabled Lee, Balmin and Jakobsson's overall system to estimate query cost, and also automate the process of candidate selection.

Regarding claim 15, Lee, Balmin and Jakobsson disclose the method of claim 14.

Lee, Balmin and Jakobsson do not explicitly disclose the statistical information comprises a frequent value list.

However, Lohman discloses the statistical information comprises a frequent value list (paragraph 35 lines 10 – 15, et seq.). At the time of the present invention, it would have been obvious to a person of ordinary skill in the data processing art to combine the two references

because Lohman's use of frequent value list would have enabled Lee, Balmin and Jakobsson's overall system to estimate query cost, and also automate the process of candidate selection.

Regarding claim 25, Lee, Balmin and Jakobsson disclose the program product of claim 22.

Lee, Balmin and Jakobsson do not explicitly disclose the statistical information comprises a frequent value list.

However, Lohman discloses the statistical information comprises a frequent value list (paragraph 35 lines 10 – 15, et seq.). At the time of the present invention, it would have been obvious to a person of ordinary skill in the data processing art to combine the two references because Lohman's use of frequent value list would have enabled Lee, Balmin and Jakobsson's overall system to estimate query cost, and also automate the process of candidate selection.

Regarding claim 29, Lee, Balmin and Jakobsson disclose the program product of claim 26.

Lee, Balmin and Jakobsson do not explicitly disclose the statistical information comprises a frequent value list.

However, Lohman discloses the statistical information comprises a frequent value list (paragraph 35 lines 10 – 15, et seq.). At the time of the present invention, it would have been obvious to a person of ordinary skill in the data processing art to combine the two references because Lohman's use of frequent value list would have enabled Lee, Balmin and Jakobsson's overall system to estimate query cost, and also automate the process of candidate selection.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sangwoo Ahn whose telephone number is (571) 272-5626. The examiner can normally be reached on M-F 10-6.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hosain Alam can be reached on (571)272-3978. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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